# Highlights of the NARMS Retail 2010 Report

*Salmonella*[1]

*Salmonella* serotypes Typhimurium, Saintpaul, and Heidelberg accounted for 44.5% of retail meat isolates (Table 6). The prevalence of serotype IIIa 18:z4,z23:- increased from 0.9% in 2003 to 6.3% in 2010, outnumbering Kentucky and removing it from the top 5 serotypes. Saintpaul remains the most common serotype in ground turkey, which was first seen in 2009. Heidelberg prevalence among all retail meat continues to decrease from 22.8 to 9% from 2002 through 2010.

First-line antimicrobial agents recommended for treating salmonellosis are ciprofloxacin, ceftriaxone and trimethoprim-sulfamethoxazole.[2]

- Quinolones – Resistance to nalidixic acid corresponds to decreased fluoroquinolone susceptibility; however, fluoroquinolone resistance has never been detected in *Salmonella* recovered from any retail meat since the program began in 2002. Only 0.3% (1/400) of *Salmonella* from all sources was nalidixic acid resistant (Table 7).
- Cephalosporins – Third-generation cephalosporin resistance rose in chicken breast (10–34.5%) and ground turkey (8.1–16.3%) isolates from 2002 to 2010 ($p < 0.05$).
- There were significant increases in ampicillin resistance among chicken breast (16.7–39.2%, $p < 0.05$) and ground turkey isolates (16.2–48%, $p<0.001$) from 2002 to 2010.
- Multidrug Resistance – 43.3% of chicken breast isolates were resistant to ≥ 3 antimicrobial classes in 2010 compared to 33.7% in ground turkey. More than 29% of chicken breast isolates showed resistance to ≥ 5 classes in 2010 (Table 10), to which serotype Typhimurium accounts for more than half of isolates resistant to ≥ 4 classes (Table 8). Serotype Albert was isolated from ground turkey for the first time since 2002 and was resistant to all 8 classes of antimicrobials tested.
- *Salmonella* isolates susceptible to all antimicrobials decreased in pork chops (50–35%) from 2009 to 2010 (Table 10). Meanwhile, *Salmonella* pansusceptibility increased among chicken breast (29–35.7%) and ground turkey (22.3–30.7%) isolates.

*Campylobacter*[3]

More than 90% of *Campylobacter* are recovered from chicken breast each year and of those isolates, the proportion of *C. jejuni* to *C. coli* is about 2:1 (Table 12).

Macrolides and fluoroquinolones are used in the treatment of *Campylobacter* infections. It is well known that *C. coli* tend to be more resistant than *C. jejuni* regardless of source, and this is reflected in the 2010 NARMS retail data with the exception of quinolones and tetracycline.

- Macrolide resistance in chicken breast isolates was seen in 4.1% of *C. coli* and 0.6% of *C. jejuni* in 2010, with no significant changes over time (Table 15).
- Ciprofloxacin resistance in *C. coli* from chicken breast rose from 10% in 2002 to its highest peak of 29.1% in 2005. Since the fluoroquinolone ban in September 2005, ciprofloxacin resistance in *C. coli* has decreased to 13.5% in 2010 (Table 15), while

[1] Nearly all salmonellae were recovered from poultry. Due to the low recovery from ground beef and pork chops (< 2%), statistical analysis of trends in resistance from these sources should be considered with caution.

[2] IDSA, Practice Guidelines for the Management of Infectious Diarrhea. *Clinical Infectious Diseases* 2001; 32:331–50.

[3] Ground beef and pork chop samples are no longer cultured for *Campylobacter*, due to their low recovery (<0.5%) from 2002–2007.

resistance in *C. jejuni* significantly increased from 15.2–22.5% from 2002 to 2010 (p=0.0003).
- Tetracycline resistance decreased in *C. jejuni* (45.8–36.3%) compared to 2009 and *C. coli* remained level at 39.2%.
- Gentamicin resistance in *C. coli* has increased to 12.8% in 2010, up from 0.7% in 2007 when it first appeared in NARMS retail meat ($p < 0.0001$).
- Multidrug resistance is rare in *Campylobacter*. There were only 9 (of 555) *Campylobacter* isolates from poultry resistant to ≥ 3 antimicrobial classes in 2010 (Table 16).

<u>*Enterococcus*</u>

*E. faecalis* (72.8% [1221/1677]) was more prevalent than *E. faecium* (27% [335/1677]) in 2010 (Table 18). Chicken breast was the only meat type where *E. faecium* was more prevalent than *E. faecalis*.

*Enterococcus* is used as a sentinel for antibiotic selection pressures by compounds with gram-positive activity. This spectrum of activity is exhibited by many antimicrobials used in food animal production; and the same classes of antibiotics are also used to treat human infections.

- No isolates were resistant to vancomycin or linezolid (Table 19). These classes of compounds are critically important in human medicine but are not used in food animal production.
- Since 2002, streptogramin resistance has significantly decreased ($p < 0.05$) in chicken breast (56.3–27.1%), ground beef (46.2–2.3%), and pork chop (27.2–3.8%) but has remained above 50% in turkey isolates.
- *E. faecalis* from poultry showed markedly higher aminoglycoside and macrolide resistance than *E. faecium*, with exception of streptomycin. *E. faecium* had much higher resistance to nitrofurantoin, penicillin and ciprofloxacin from all sources compared to *E. faecalis* (Table 20.1-2).
- Multidrug resistance from 2002–2010 was highest in *E. faecium* isolates from poultry in comparison to multidrug resistant *E. faecalis* (Table 21.1-2).

<u>*Escherichia coli*</u>

*E. coli* are common in all retail meat products tested in NARMS. Of 1,840 retail meats tested in 2010 64% were culture positive for *E. coli*, with pork chops having the lowest prevalence (39.8%) and ground turkey with the highest (80.2%).

- Ceftriaxone resistance among *E. coli* isolates from chicken breast is consistently higher than any other retail meat tested (Table 24).
- Ciprofloxacin resistance remained low (< 1.0%) among *E. coli* isolates (Table 24).
- From 2002–2005, nalidixic acid resistance in *E. coli* from chicken breast increased from 2.8–6.6% and increased in ground turkey from 4.3–10.4%. Since the fluoroquinolone ban in September 2005, resistance has decreased to 3.6% in chicken breast and 2.7% in ground turkey (Table 24). Nalidixic acid resistance in ground beef and pork chops remains < 2%.
- Gentamicin resistance is much higher in retail poultry isolates (> 20%) than ground beef and pork chop isolates (< 5%, Table 24).
- A highly statistically significant trend ($p < 0.0001$) in ampicillin resistance was seen among ground turkey with 52.6% resistance in 2010, up from 31.3% in 2002.